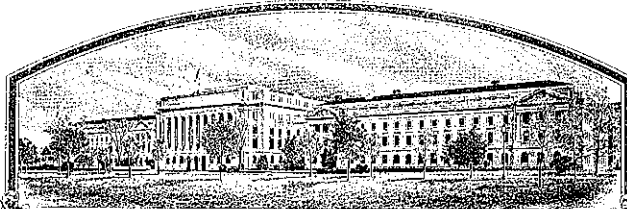


No.

9500040



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Michigan State University

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED, PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE VARIETY. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT

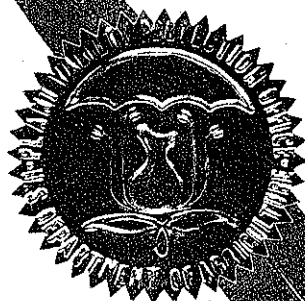
'Lowell'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this thirty-first day of July in the year of our Lord one thousand nine hundred and ninety-six.

Attest:

Marsha A. Stanton
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Jan F. Feltman
Secretary of Agriculture



U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE DIVISION

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(INSTRUCTIONS ON REVERSE)

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) (as it is to appear on the Certificate)

Michigan Agricultural Experiment Station

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO.

C4827

3. VARIETY NAME

Lowell

4. ADDRESS (street and no. or R.F.D. no., city, state, and ZIP)

109 Agriculture Hall
Michigan State University
East Lansing, MI 48824-1039

5. PHONE (include area code)

517/355-0123

FOR OFFICIAL USE ONLY

PVPO NUMBER

9500040

6. GENUS AND SPECIES NAME

Triticum aestivum L.

7. FAMILY NAME (Botanical)

Poaceae

8. CROP KIND NAME (Common Name)

Soft winter wheat

9. DATE OF DETERMINATION

Dec., 1992

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.)

Agricultural Experiment Station

11. IF INCORPORATED, GIVE STATE OF INCORPORATION

Michigan

12. DATE OF INCORPORATION

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS

Dr. L.O. Copeland
Dept. of Crop and Soil Sciences
278 Plant and Soil Sciences Building
Michigan State University
East Lansing, MI 48824-1325

PHONE (include area code): 517/353-9545

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow INSTRUCTIONS on reverse)

- a. ☒ Exhibit A, Origin and Breeding History of the Variety
- b. ☒ Exhibit B, Novelty Statement
- c. ☒ Exhibit C, Objective Description of Variety
- d. ☒ Exhibit D, Additional Description of Variety
- e. ☒ Exhibit E, Statement of the Basis of Applicant's Ownership
- f. ☒ Seed Sample (2,500 viable untreated seeds). Date Seed Sample mailed to Plant Variety Protection Office _____
- g. ☒ Filing and Examination Fee (\$2,325) made payable to "Treasurer of the United States"

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? (See section 83(a) of the Plant Variety Protection Act) ☒ YES (If "YES," answer items 16 and 17 below) ☐ NO (If "NO," skip to item 18 below)

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? ☒ YES ☐ NO

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?

☒ FOUNDATION ☐ REGISTERED ☒ CERTIFIED

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?

☐ YES (If "YES," through _____ Plant Variety Protection Act ☐ Patent Act. Give date: _____)

☒ NO

19. HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETING IN THE U.S. OR OTHER COUNTRIES? ☒ YES (If "YES," GIVE NAMES OF COUNTRIES AND DATES) U.S. - September 1994 ☐ NO

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in section 41, and is entitled to protection under the provisions of section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT [Owner(s)]

CAPACITY OR TITLE

Assistant Vice President
for Finance

DATE

September 26, 1994

SIGNATURE OF APPLICANT [Owner(s)]

CAPACITY OR TITLE

DATE

Exhibit A. Origin and Breeding History of Lowell Wheat

'Lowell' is a soft white winter wheat (*Triticum aestivum* L.) developed by Michigan State University. Certified seed of lowell will be available to farmers in 1994.

Lowell is a pure-line selection from the 1978 cross 780756 which has the parentage X0467/B2141//B5250.

The parentage of MSU line X0467 is 'Genesee'/'Winoka'.

The parentage of MSU line B2141 is ('Suwon 92'/'Brevor'//5*'Genesee', A6506)/4/(A4528,Norin 10/Brevor//Yorkwin/3/3*Genesee)

The parentage of MSU line B5250 is (Talbot/CI8487, B0049)/3/(A6200, Genesee*4//Norin 10/Brevor)

F_{2:3} head rows from the 780756 cross were planted in 1979. F_{2:4} bulk selections were subjected to a further round of head selection resulting in F_{4:5} head rows. Two subsequent generations of bulk selection resulted in an F_{4:6} line designated C4227. That line, which was segregating for grain color, was evaluated in yield trials from 1985 through 1987. Manual separation and increase of white and red seed of C4227 during 1988 generated two sister lines designated C4227 (red seed) and C4827 (white seed). C4827 was evaluated in yield trials in 1989 through 1992. Breeder seed of Lowell was initially constituted in 1990 from yield test derived F_{4:11} seed of C4827. Milling and baking quality evaluations have been conducted on Lowell since 1989.

Lowell has been stable and uniform as described in exhibit "C" in the four years (1990-1993) since creation of the initial lot of breeders seed. Lowell exhibits variants at or below the levels indicated below:

- 1) taller plants, awnless heads, white glume - 2.8 percent
- 2) taller plants, awnless head, brown glume - 0.9 percent
- 3) taller plants, awned heads, white glume - 0.7 percent
- 4) taller plants, awned head, brown glume - 0.3 percent
- 5) up to 1.25% red-seeded variant in harvested seed

Exhibit B. Novelty Statement (Lowell).

Lowell is a awnless soft white winter wheat with white glumes at harvest. In Michigan, it most closely resembles Augusta. Compared to Augusta, Lowell is 3-5 days earlier to flower, has a more open spike, and has longer kernels. Lowell also has little or no pubescence on its auricles while Augusta's auricles are generally pubescent.



OBJECTIVE DESCRIPTION OF VARIETY

WHEAT (*TRITICUM* spp.)

INSTRUCTIONS: See Reverse.

NAME OF APPLICANT(S) Michigan Agricultural Experiment Station	FOR OFFICIAL USE ONLY
ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code) 109 Agriculture Hall Michigan State University East Lansing, MI 48824-1039	PVPO NUMBER 9500040 VARIETY NAME OR TEMPORARY DESIGNATION Lowell

Place the appropriate number that describes the varietal character of this variety in the boxes below. Place a zero in first box (e.g.

0	8	9
---	---	---

 or

0	9
---	---

) when number is either 99 or less or 9 or less.

L. KIND:

1 = COMMON 2 = DURUM 3 = EMMER 4 = SPELT 5 = POLISH 6 = POULARD 7 = CLUB

2. TYPE,

2 1 = SPRING 2 = WINTER 3 = OTHER (Specify) _____ 1 1 = SOFT 2 = HARD 3 = OTHER (Specify)

1 1 = WHITE 2 = RED 3 = OTHER ($S_{Spec}(y)$)

3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:

1	5	9	FIRST FLOWERING	1	6	3	LAST FLOWERING
---	---	---	-----------------	---	---	---	----------------


4. MATURITY (50% Flowering):

NO. OF DAYS EARLIER THAN 1 = ARTHUR 2 = SCOUT 3 = CHRIS
 0 2 NO. OF DAYS LATER THAN 1 4 = LEMHI 5 = NUGAINES 6 = LEEDS

5. PLANT HEIGHT (From soil level to top of head):

1	1	0	CM. HIGH
---	---	---	----------

1 5 CM. TALLER THAN 1

 CM. SHORTER THAN 

1 = ARTHUR 2 = SCOUT 3 = CHRIS
 4 = EMHI 5 = NUGAINE 6 = LEEDS

6. PLANT COLOR AT BOOTING (See reverse):

2 1 = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN

7. ANTHER COLOR:

1 = YELLOW 2 = PURPLE

8. STEM:

1 Anthocyanin: 1 = ABSENT 2 = PRESENT

1 Waxy bloom: 1 = ABSENT 2 = PRESENT

1 Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT

1 Internodes: 1 = HOLLOW 2 = SOLID

0	4	NO. OF NODES (Originating from node above ground)
---	---	---

2	1	CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW
---	---	--

9. AURICLES:

1 Anthocyanin: 1 = ABSENT 2 = PRESENT

1 Hairiness: 1 = ABSENT 2 = PRESENT

10. LEAF:

2 Flag leaf at booting stage: 1 = ERECT 2 = RECURVED
3 = OTHER (Specify): _____

2 Flag leaf: 1 = NOT TWISTED 2 = TWISTED

1 Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT

1 Waxy bloom of flag leaf sheath: 1 = ABSENT 2 = PRESENT

1	1	MM. LEAF WIDTH (First leaf below flag leaf)
---	---	---

2	7
---	---

 CM. LEAF LENGTH (First leaf below flag leaf):

11. HEAD:

☐ 1 Density: 1 = LAX 2 = DENSE ☐ 1 Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE
4 = OTHER (Specify) _____

☐ 2 Awnedness: 1 = AWNLESS 2 = APICALLY AWNLETED 3 = AWNLETED 4 = AWNED

☐ 1 Color at maturity: 1 = WHITE 2 = YELLOW 3 = PINK 4 = RED
5 = BROWN 6 = BLACK 7 = OTHER (Specify) _____

☐ 0 ☐ 8 CM. LENGTH ☐ 1 ☐ 0 MM. WIDTH

12. GLUMES AT MATURITY:

☐ 2 Length: 1 = SHORT (CA. 7 mm.) 2 = MEDIUM (CA. 8 mm.) 3 = LONG (CA. 9 mm.)
☐ 2 Width: 1 = NARROW (CA. 3 mm.) 2 = MEDIUM (CA. 3.5 mm.) 3 = WIDE (CA. 4 mm.)

☐ 3 Shoulder shape: 1 = WANTING 2 = OBLIQUE 3 = ROUNDED 4 = SQUARE 5 = ELEVATED 6 = APICULATE
☐ 1 Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE

13. COLEOPTILE COLOR:

☐ 1 1 = WHITE 2 = RED 3 = PURPLE

14. SEEDLING ANTHOCYANIN:

☐ 1 1 = ABSENT 2 = PRESENT

15. JUVENILE PLANT GROWTH HABIT:

☐ 3 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

16. SEED:

☐ 3 Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL ☐ 1 Check: 1 = ROUNDED 2 = ANGULAR

☐ 1 Brush: 1 = SHORT 2 = MEDIUM 3 = LONG ☐ 1 Brush: 1 = NOT COLLARED 2 = COLLARED

☐ Phenol reaction (See instructions): 1 = IVORY 2 = FAWN 3 = LT. BROWN
4 = BROWN 5 = BLACK

☐ 1 Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE 5 = OTHER (Specify) _____

☐ 0 ☐ 8 MM. LENGTH ☐ 0 ☐ 3 MM. WIDTH ☐ 4 ☐ 0 GM. PER. 1000 SEEDS

17. SEED CREASE:

☐ 1 Width: 1 = 60% OR LESS OF KERNEL 'WINOKA'
2 = 80% OR LESS OF KERNEL 'CHRIS'
3 = NEARLY AS WIDE AS KERNEL 'LEMHI'
☐ 1 Depth: 1 = 20% OR LESS OF KERNEL 'SCOUT'
2 = 35% OR LESS OF KERNEL 'CHRIS'
3 = 50% OR LESS OF KERNEL 'LEMHI'

18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

☐ 0 STEM RUST (Races) ☐ 1 LEAF RUST (Races) ☐ 0 STRIPE RUST (Races) ☐ 0 LOOSE SMUT
☐ 2 POWDERY MILDEW ☐ 0 BUNT ☐ OTHER (Specify) _____

19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

☐ 0 SAWFLY ☐ 0 APHID (Bydv.) ☐ 0 GREEN BUG ☐ 0 CEREAL LEAF BEETLE
☐ 0 OTHER (Specify) _____ HESSIAN FLY RACES: ☐ GP ☐ A ☐ B ☐ C
☐ D ☐ E ☐ F ☐ G

20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	Mendon	Seed size	Mendon
Leaf size	Mendon	Seed shape	Mendon
Leaf color	Mendon	Coleoptile elongation	Mendon
Leaf carriage	Mendon	Seedling pigmentation	Mendon

INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

(a) L.W. Briggie and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States, Technical Bulletin 1278, United States Department of Agriculture.

Exhibit D. Additional Description of Variety (Lowell).**Objective Description**

Lowell has large white seeds, is beardless with white chaff at harvest, and is slightly shorter than Augusta. Lowell flowers 3-5 days earlier than Augusta. Its winterhardiness is not known to differ from that of Augusta or Frankenmuth. Lowell's resistance to lodging is poor. Lowell exhibits good field resistance to powdery mildew and wheat spindle streak virus, and possesses an unknown major gene for leaf rust resistance. Races that are virulent against this unknown leaf rust resistance have occurred in Michigan. Lowell will exhibit very susceptible reactions when challenged with virulent leaf rust races.

Lowell is uniform and stable and contains variants at levels at or below the levels indicated below:

- 1) Awnless, taller plants - Percent to be determined and provided later.
- 2) Brown glumed, awned plants - Percent to be determined and provided later.
- 3) Kernels with red seed coat - Percent to be determined and provided later.

See
revised
Edn. A
AAA
2 July 1996

Performance

Agronomic and quality performance data for Michigan tests conducted between 1986 and 1992 are summarized in the attached table. Data for 1985 through 1987 are for the mixed color progenitor of both C4227 and C4827, now "Mendon" and "Lowell", respectively. In multi-location yield tests conducted in Michigan in 1990 through 1992, Lowell averaged 86.3 bushels per acre across the 19 site-years, compared with 78.3 and 75.6 bushels per acre for Augusta and Frankenmuth, respectively. Lowell's 1990-1992 yield average in Michigan's "Thumb" region (6 site-years) was 102.6 bushels per acre compared to 89.9 and 86.1 bushels per acre for Augusta and Frankenmuth. Lowell's test weight is slightly below average and is usually similar to Augusta's. Yearly evaluations at the USDA Soft Wheat Quality Laboratory in Wooster, Ohio have shown that Lowell exhibits superior milling and baking properties.

Exhibit E. Statement of Ownership

The variety for which Plant Variety Protection is hereby sought was developed by Dr. E. Everson and Dr. R. Ward, employees of Michigan State University. All rights to any invention, discovery, or development made by these employees while employed by Michigan State University were assigned to Michigan State University. No rights of any kind pertaining to Lowell are retained by the aforementioned or by any other employees.